

What is claimed is:

1. An exhaust-heat recovery system for engine comprising:
  - a catalytic converter through which exhaust discharged from an engine is passed and in which combustible components in the exhaust are burned through catalysis;
  - an exhaust heat exchanger where heat is exchanged between the exhaust having passed through the catalytic converter and a heat-transfer medium having passed through the engine;
- 10 an air conditioner with a heat exchanger for heating where a heating wind is generated by means of the heat exchange between the heat-transfer medium having passed through the exhaust heat exchanger and an air conditioning wind; and
- 15 an engine controller for performing incremental control on the combustible components in the exhaust to be burned in the catalytic converter when the prescribed condition for heating is not satisfied.

  

2. The exhaust-heat recovery system according to claim 1, wherein the incremental control on the combustible components is such that the amount of unburned hydrocarbon in the exhaust discharged from the engine is increased.
- 20
3. The exhaust-heat recovery system according to claim 1, wherein the incremental control on the combustible components is performed when the vehicle is at rest but the engine is still in operation.
- 25

4. The exhaust-heat recovery system according to claim 1, wherein  
the condition for heating is specified by at least one of a temperature of the  
heat-transfer medium, a demand for an increase in heating power of the air  
conditioner, and an exchanged heat quantity in the exhaust heat  
5 exchanger.

5. The exhaust-heat recovery system according to claim 4, wherein  
the temperature of the heat-transfer medium is measured at, at least one of  
a heat-transfer medium channel from the engine to the exhaust heat  
10 exchanger, a heat-transfer medium channel from the exhaust heat  
exchanger to the heat exchanger for heating, a heat-transfer medium  
channel from the heat exchanger for heating to the engine, a heat-transfer medium  
passage within the engine, a heat-transfer medium passage within  
the exhaust heat exchanger and a heat-transfer medium passage within  
15 the heat exchanger for heating.

6. The exhaust-heat recovery system according to claim 4, wherein  
the demand for an increase in heating power of the air conditioner is  
outputted from the air conditioner on the basis of at least one of the  
20 difference between a target temperature in the vehicle set by an occupant  
and an actual temperature in the vehicle or an actual temperature outside  
the vehicle, and a target temperature of an air conditioning wind at an  
outlet thereof.

25 7. The exhaust-heat recovery system according to claim 4, wherein  
the exchanged heat quantity in the exhaust heat exchanger is calculated

from at least one of the difference between a temperature of the heat-transfer medium at an inlet portion of the exhaust heat exchanger and that at an outlet portion of the exhaust heat exchanger, the difference between a temperature of the exhaust at an inlet portion of the exhaust 5 heat exchanger and that at an outlet portion of the exhaust heat exchanger, the difference between a volumetric flow rate of the exhaust at an inlet portion of the exhaust heat exchanger and that at an outlet portion of the exhaust heat exchanger, the exhaust volume in the engine, the exhaust temperature in the engine, the amount of fuel used in the engine, and the 10 amount of air used in the engine.

8. The exhaust-heat recovery system according to claim 1, further comprising:

15 a bypass channel along which the exhaust having passed through the catalytic converter passes bypassing the exhaust heat exchanger;

a main channel along which the exhaust having passed through the catalytic converter passes through the exhaust heat exchanger; and

an exhaust channel switching valve for closing either the bypass channel or the main channel.

20

9. The exhaust-heat recovery system according to claim 1, wherein the exhaust discharged from the engine passes sequentially through the catalytic converter, the exhaust heat exchanger and a muffler toward the downstream side of the engine, and then is discharged into the air.

25

10. The exhaust-heat recovery system according to claim 1, wherein

the heat-transfer medium flows out of the engine, and then passes sequentially through the exhaust heat exchanger and the heat exchanger for heating, and returns to the engine.

5 11. The exhaust-heat recovery system according to claim 1, further comprising:

a bypass channel along which the heat-transfer medium is directly delivered bypassing the exhaust heat exchanger from the engine to the heat exchanger for heating;

10 a main channel along which the heat-transfer medium passes through the exhaust heat exchanger; and

an medium channel switching valve for closing either the bypass channel or the main channel.

15 12. The exhaust-heat recovery system according to claim 1, further comprising:

an oil warmer for generating the heat exchange between the heat-transfer medium and a transmission lubricant on the downstream side of the heat exchanger for heating.

20

13. The exhaust-heat recovery system according to claim 12, further comprising:

a bypass channel along which the heat-transfer medium passes bypassing the oil warmer;

25 a main channel along which the heat-transfer medium passes through the oil warmer; and

an warmer switching valve for closing either the bypass channel or the main channel.

5